LAUDA

Operating Instructions

ECOLINE ★ STAREDITION

Low-temperature thermostats
RE 104, RE 105
RE 106, RE 107,
RE 110, RE 112, RE 120

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YACE0059

Safety notes

Before operating the equipment please read carefully all the instructions and safety notes. If you have any questions please phone us!

Follow the instructions on setting up, operation etc. This is the only way to avoid incorrect operation of the equipment and to ensure full warranty protection.

- Transport the equipment with care!
  The unit may NEVER be overturned nor put upside down!
- Equipment and its internal parts can be damaged:
  - by dropping
  - by shock.
- Equipment must only be operated by technically qualified personnel!
- Never operate the equipment without the bath liquid!
- Do not start up the equipment, if
  - it is damaged or leaking,
  - the supply cable is damaged.
- Switch off the equipment and pull out the mains plug:
  - for servicing or repair
  - before moving the equipment!
- Drain the bath before moving the equipment!
- Have the equipment serviced or repaired by properly qualified personnel only!

The Operating Instructions include additional safety notes which are identified by a triangle with an exclamation mark. Carefully read the instructions and follow them accurately! Disregarding the instructions may have serious consequences, such as damage to the equipment, damage to property or injury to personnel!

We reserve the right to make technical alterations!

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1 Safety notes

1.1 General safety notes

A laboratory thermostat is intended for heating and pumping liquids according to the needs of the user. This leads to hazards by high temperatures, fire, and the general hazards by the use of electrical energy.

The user is largely protected through the application of the appropriate standard specifications..

Additional hazards may arise from the type of material being thermostated, e.g. when going above or below certain temperature levels or through breaking of the container and reaction with the thermostating liquid.
It is not possible to cover all possibilities; they remain largely within the responsibility and the judgement of the user.

The unit must only be used as intended and as described in these Operating Instructions. This includes operation by suitably instructed qualified personnel.

The units are not designed for use under medical conditions according to EN 60601-1 or IEC 601-1 !

1.2 Other safety notes

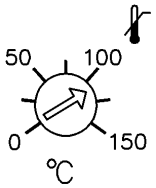
- Connect the unit only to grounded mains power (PE).
- Parts of the bath cover may reach surface temperatures above 70 °C when operating at higher temperatures. Take care when touching it!
- Use suitable hoses ⇨ Section 6.3
- Protect tubing with hose clips against slipping off. Prevent kinking of tubing!
- Check tubing from time to time for possible material defects!
- Heat transfer tubing and other hot parts must not come into contact with the supply cable!
- When using the thermostat as circulation thermostat, failure of tubing may lead to leaking of hot liquid and become a danger to personnel and objects.
- When no external consumer is connected to the thermostat the pump outflow must be closed (use closing plugs) or linked to the return!
- Allow for expansion of the bath oil at elevated temperatures!
- Depending on the bath liquid used and the mode of operation it is possible for toxic vapours to be produced. Ensure appropriate ventilation!
- When changing the bath liquid from water to oil, for temperatures above 100 °C, carefully remove all traces of water, also from tubing and from the external consumer, otherwise → danger of burns through delayed boiling!
- Always pull out the mains plug before cleaning, maintenance or moving the thermostat!
- Repairs on the control unit and the refrigeration system must be carried out by properly qualified personnel only
- Values for temperature control and indicating accuracy apply under normal conditions according to DIN 12876. High-frequency electromagnetic fields may under special conditions lead to unfavourable values. This does not affect the safety!

Explanation of signs:

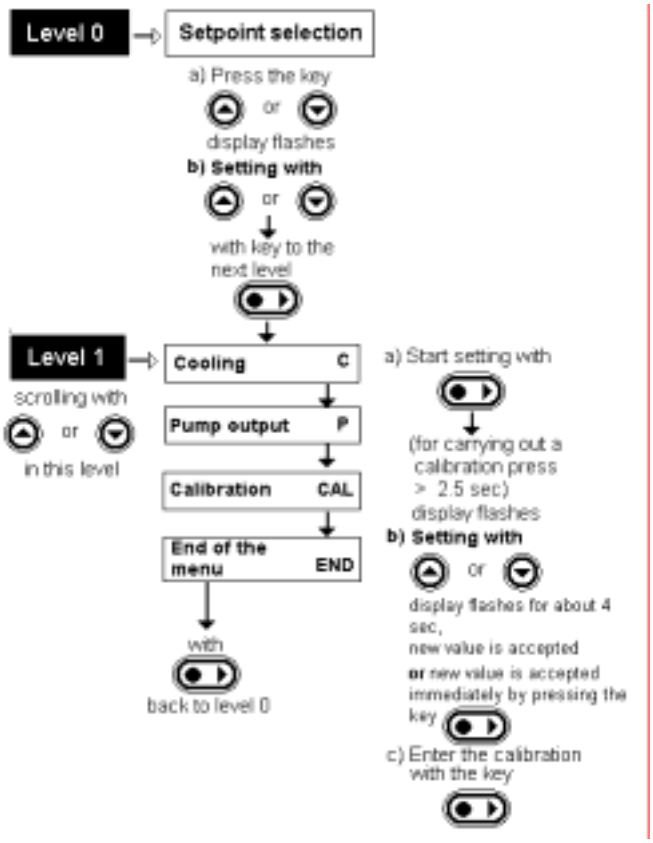
	Danger:	This sign is used where there may be injury to personnel if a recommendation is not followed accurately or is disregarded.
	Note	Here special attention is drawn to some aspect. May include reference to danger.
	Reference:	Refers to other information in different sections.

2 Brief operating instructions

This brief instruction shall give you the possibility to operate the unit quickly. For safe operation of the unit it is absolutely necessary to read carefully all the instructions and safety notes!

1. Assemble unit and add items as appropriate (⇨ Section 6.
   Take care of the hose tubing connections (⇨ Section 6.1. and 6.4.
2. Fill the unit with corresponding liquid. (⇨ Section 6.3.).
   The units are designed for operation with non-flammable and flammable liquids to EN 61010-2-010. →
   Take care of the level of the bath liquid! (⇨ Section 6.2.)
3. Connect the unit only to a socket with a protective earth (PE) connection. Compare the information on the rating label with the supply details.
4. 

   Using a screwdriver, set the over temperature cut-out point to a value clearly above ambient temperature. (⇨ Section 7.3)
5. Switch on at the mains switch
6. Setting of the functions



3 Control and functional elements

LED green, Supply ON

Menu functions

Pump connections:
– Return to the bath
– Pump outflow, Pressure output
(⇨ labelling housing)

Bath bridge

Setting of the over
temperature switch-off point

Mains switch

Bath cover

4 Unit description

4.1 Environmental conditions

The operation of the thermostats is only allowed under the following conditions as specified in EN 61010-2-010:2003 and EN 61010-1:2001:

- Indoor use.
- Altitude up to 2000 m above sea level.
- Foundation must be dense, even, non-slippery and non-flammable.
- Keep clear distance (⇨ Section 6.1 Assembly and setting up).
- Ambient temperature range (⇨ Section 9 Technical data (according to DIN 12876)).
  Use only within this range for an undisturbed operation.
- Mains supply voltage fluctuations (⇨Section 9 Technical data (according to DIN 12876)).
- Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C.
- Transient over voltage according to Installation Categories (Over voltage Categories) II
- Pollution degree: 2.

4.2 Unit types

The type designation of the Ecoline low-temperature thermostats consists of the letter R (identification as low-temperature unit), the control unit E 100 and the type of bath and refrigeration system.

Example: Refrigeration unit R, Control unit E 100 and bath and refrigeration system 004 produces Thermostat Type RE 104.

Type RE 120 is supplied without bath cover. A bath cover is available as accessory.
(⇨ Section 10. Accessories).

4.3 Baths

All units provide a stainless steel bath. The last two digits of the model no. correspond to the approximate total volume in Litre (e.g. bath RE 106 = approx. 6 Litre).

Part of this volume may be used to insert objects.

Exception!

Model no. RE 105 was especially optimised for tempering external vessels and therefore does not provide any usable bath volume for inserting objects.

4.4 Pump

All units are equipped with a pressure pump with vario drive. The pump has an outflow with a rotatable bend which is connected to the pump nipple for external thermostating units. An additional outflow provides circulation inside the bath.
By turning the flow setting knob it is possible to choose between both outlets or to divide the flows.

The pump ca n be used up to viscosities of 150mm²/s. However, to get an optimum accuracy of control a viscosity of < 30 mm²/s is recommended.

One of five pump output steps can be selected using the operating menu.
On small low-temperature thermostats (e.g. RE 104 or RE 106) and with operation as bath thermostat it is advisable to use output step 2. The advantage is a low heat generation while having a uniform circulation.

When operating as circulation thermostat with an external circuit it is preferable to use a larger flow rate in order to ensure a small temperature difference, especially at higher temperatures and in conjunction with oil as the bath liquid.

The pump outflow connection can be closed without causing any damage to the pump.

Pump characteristics (⇨ Section 9 Technical data)

4.5 Materials

All parts which come into contact with the bath liquid are made from high-grade materials appropriate to the operating temperature. These are rust-free stainless steel, PPS plastics and fluoride rubber

4.6 Temperature indication, control and safety circuit

The equipment is provided with a 7 segment LCD-Display (3 ½ places) with additional symbols for indicating bath temperature and settings as well as operating states. The set point can be input and additional adjustments can be made using either two or three keys.

A Pt 100 temperature probe is used for measuring the actual temperature and for control. A second Pt 100 serves as independent temperature probe for the safety circuit (over temperature protection) which is independent of the control function

A low-level cut-out switches off the heating on both poles in order to prevent dry operation of the heater. The pump is switched off through the electronics. The setting of the over temperature cut-out is adjusted with a tool on a potentiometer and is always limited to 5°C above the operating temperature range.

All settings and fault messages are stored in the memory in case of a supply failure or when the mains switch is set to OFF.

The tubular heater is controlled from a modified PID controller through a triac circuit specially designed to be unaffected by supply variations and interference.

4.7 Refrigeration system

The refrigeration system consists essentially of a hermetically sealed compressor. Heat of condensation and motor heat are dissipated by a fan-cooled finned condenser. Fresh air is drawn in at the front of the unit, warmed air is discharged at the back and to the sides. The ventilation openings must not be restricted in order to ensure proper air circulation.

At working temperatures below approx. 30 °C the refrigeration system operates continuously to remove a certain amount of heat, with the heater acting in opposition to provide automatically controlled heating power.

The compressors are fitted with a temperature monitor which responds both to the compressor temperature and to the motor current. In addition the cooling system is protected against excessive pressure by a pressure monitor. The refrigeration unit is switched on either automatically or manually through the operating menu .(⇨ Section 7.4.1).

When the fault circuit is activated the refrigeration system is also switched off.

Cooling curves (⇨ Section 9 Technical Data)

5 Unpacking

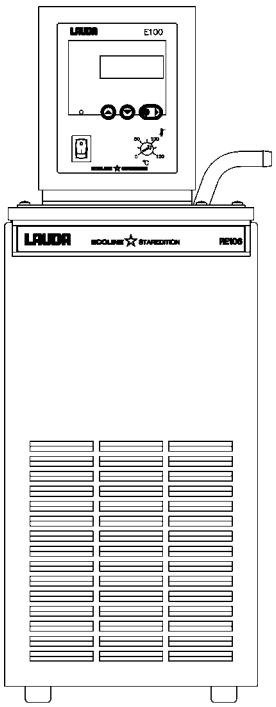
After the unit and accessories have been unpacked they have to be examined for possible transport damage. If there is any damage visible on the unit, the forwarding agent or the post office has to be notified so that the shipment can be examined.

Standard accessories:

Reference number	Quantity	**Designation**	
--	--	Bath cover	except for RE 120
HDQ 084	1	Bath cover RE 004	at RE 104
HDQ 086	1	Bath cover RE 012	at RE 105, RE 110 and RE 112
HDQ 085	1	Bath cover FBC 020	at RE 106 and RE 107
UD 435	1	Closing plugs	
EZB 260	1	Warning label	
YACE0059	1	Operating Instruction	

6 Preparations

6.1 Assembly and setting up



– Place the unit on a flat surface.

– The unit may NEVER be overturned or put upside down!

– After transport and before starting up, store it standing in upright position for two hours if possible.

– Do not cover the ventilation openings at the back of the unit and its lower part.

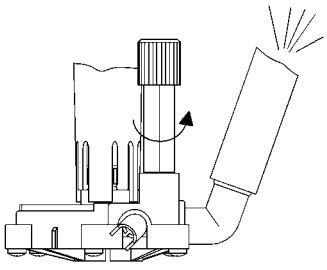
– Keep clear distance of at least 40cm.

– Adjust the flow setting knob so that when using the unit as bath thermostat (no external circulation) the flow emerges at the opening for the bath circulation, or link together the pump connections. (See ill. 3).

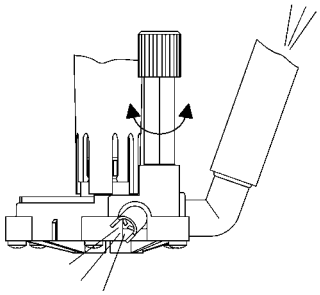
Operation with external consumer
(circulation thermostat) (⇨ Section 6.4.)

Adjustments of the pump outflows (⇨ Section 6.4)

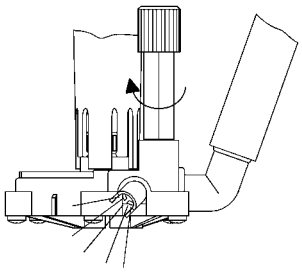
Ill 1
Flow setting knob turned anticlockwise



Ill 1
Flow setting knob medium position



Ill 3.
Flow setting knob turned clockwise



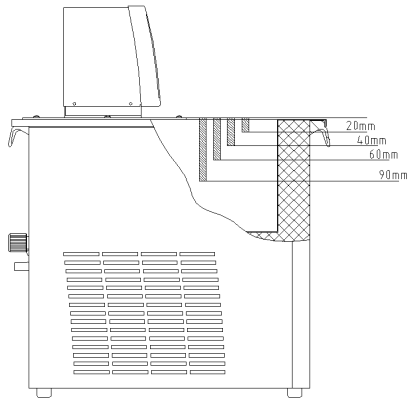
– When operating as bath thermostat without external consumer the pump outflow connection has to be closed (use closing plugs) or linked to the return.

– At bath temperature above 70°C the label supplied must be affixed on the bath in a clearly visible position!

- The unit can be operated safely up to an ambient temperature of 40°C.
- Depending on the loading of the refrigeration system, a temporary shut-off can occur, especially in case of an ambient temperature of over 35°C.
  Additionally a higher ambient temperature results in less refrigerating capacity.
- When starting up the refrigeration system after a longer time, it can take up to 30min, depending on the ambient temperature and the unit type, until the nominal refrigerating capacity is reached.

6.2 Filling and emptying

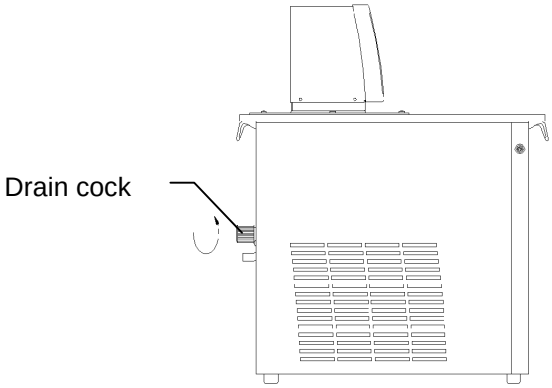
Filling



- Close the drain cock.
- Fill baths up to a maximum level of 20mm below the bath bridge.
- Optimum operation at 20-40mm below the bath bridge.
- Operation is possible down to 60mm below the bath bridge.
- The low-level cut-out operates approx. 90mm below the bath bridge!!!

- When using thermal oils it is necessary to allow for an expansion of approx. 8% / 100°C.
- When operating with an external consumer the total expansion takes place in the bath.

Emptying



- Switch off the thermostat, pull out the mains plug!
- Drain the bath liquid through the drain cock
  → using tubing

- The units are designed for operation with non-flammable and flammable liquids to EN 61010-2-010! Flammable liquids can be operated up to no more than 25°C below the fire point (⇨ Section 6.3.).
- Observe the appropriate regulation when disposing used thermostating liquid.
- When connecting an external consumer take care of the bath liquid level for it must not decrease too much → fill in bath liquid if necessary.

- Do not drain the thermostating liquid when it is hot or very cold (below 0°C)!

6.3 Bath liquids and hose connections

Bath liquids

LAUDA Designation		Working temperature range	Chemical Designation	Viscosity (kin)	Viscosity (kin) at Temperature	Fire point	Ref. No. Quantity		
	Former designation	from °C to °C		mm²/s at 20°C	mm²/s		5 l	10 l	20 l
Aqua 90 ①	water ①	+5...+90	deionised water	1	--	--	LZB 120	LZB 220	LZB 320
Kryo 30 ②	G 100 ②	-30...+90	Mono-ethylene-glycol/water	4	50 at -25°C	--	LZB 109	LZB 209	LZB 309
Kryo 51	---	-50...+120	Silicone oil	5	34 at -50°C	> 160	LZB 121	LZB 221	LZB 321
Kryo 20	160 MS	-20...+180	Silicone oil	11	28 at -20°C	> 230	LZB 116	LZB 216	LZB 316
Ultra 350 ③	330SCB ③	+30...+200	synthetic thermal oil	47	28 at +30°C	> 240	LZB 107	LZB 207	LZB 307
Therm 200	RDS 50	+60...+200	Silicone oil	44	28 ... +60°C	> 362	LZB 117	LZB 217	LZB 317

① At higher temperatures → Evaporation losses → Use bath covers (⇨ Section 10). Distilled water or fully deionised water must only be used with the addition of 0,1g sodium carbonate (Na_2CO_3) /litre water, otherwise → danger of corrosion

① Water content falls after prolonged operation at higher temperatures → mixture becomes flammable (flash point 128 °C) → Check the mixture ratio with a dosimeter.

③ Do not use in conjunction with EPDM tubing!

– When selecting bath liquids it should be noted that performance must be expected to worsen at the lower limit of the operating temperature range due to increasing viscosity. The full operating range should only be utilised if really necessary.

– The operating ranges of the bath liquids and tubing represent general data which may be limited by the operating temperature range of the unit.

– Silicone oil causes pronounced swelling of Silicone rubber → never use Silicone oil with Silicone tubing!

DIN Safety data sheets are available on request

Hose connections

Tubing type	Int. dia. Ø mm	Temperature range °C	Application	Ref. No.
EPDM-tubing, non-insulated	12	10 to 120	for all bath liquids except for Ultra 350 and mineral oils	**RKJ 112**
EPDM-tubing insulated	12 ext. dia. 35mm approx.	-60 to 120	for all bath liquids except for Ultra 350 and mineral oils	**LZS 021**
EPDM-tubing insulated	12 ext. dia. 55mm approx.	-100 to 120	for all bath liquids except for Ultra 350 and mineral oils	**LZS 022**
Silicone tubing, non-insulated	11	-30 to 100	water, water/glycol mixture	**RKJ 059**
Silicone tubing insulated	11 ext. dia. 35mm approx.	-60 to 100	water, water/glycol mixture	**LZS 007**

- EPDM-tube, not for Ultra 350 and not for mineral oils!
- Silicone oil causes pronounced swelling of Silicone rubber → never use Silicone oil with Silicone tubing!
- Protect tubing with hose clips against slipping off!

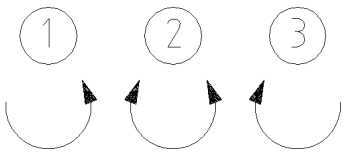
6.4 Connection of external circuits

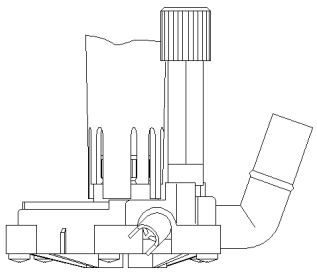
Operation as circulation thermostat

- When used as circulation thermostat, care for shortest hose connections with largest inner diameter as possible. This gives the best flow.
- Connect 11-12mm int. dia. tubing (⇨ Section 6.3.) to the pump connector.
- Pump connections
  – return to bath
  – pump outflow, pump pressure
  (⇨ labelling housing).

- If the cross-section of the tubing is too small → temperature drop between bath and external system due to low flow rate. Increase the bath temperature appropriately.
- Always ensure the maximum possible flow cross-section in the external circuit!

- When the external consumer is placed at a higher level than the thermostat the pump is stopped and air penetrates into the thermostating circuit the external liquid may drain down into the bath even with a closed system → danger of flooding the thermostat!
- Protect tubing with hose clips against slipping off!!
- When no external consumer is connected to the thermostat, the pump outflow connection must be closed (use closing plugs) or linked to the return.





- Using the flow setting knob at the pump outflows, divide up the pump flow in accordance to the thermostating task. (⇨ Section 6.1)
- Position ① → maximum flow in the external circuit, the flow setting knob is turned anticlockwise.
- Position ②→ flow passes through pump outflow and outlet for bath circulation, the flow setting knob is in medium position.
- Position ③ → external circuit is closed and the outlet for bath circulation fully open, the flow setting knob is turned clockwise.

- Operate the flow setting knob only when the bath contents are near the ambient temperature.
- When no tubing is connected, close the pump outflow with closing plugs even in position ③.

7 Starting up

7.1 Connection to the supply

Compare the supply voltage against the data on the rating label.

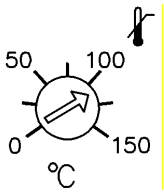
Model according to EMC directive EN 61326-1 class B.*

- Connect the unit only to a grounded mains power socket (PE).
- No warranty when the thermostat is connected to a wrong supply!
- Please make sure that your mains plug is equipped with at least the following safety fuses.

Power supply	Fuse protection
230V	16A
208V	15A
115V	15A

- The start current of the refrigerating machine may exceed those currents distinctly for a short time.
- Without external circuit ensure that the pump pressure outflow is closed or linked to the pump return.
- Ensure that the unit is filled in accordance with Section 6.2!

7.2 Switching on



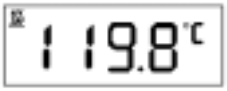
- Using a screwdriver. Set the overtemperature switch-off point to a value clearly above ambient temperature.

- Switch on at the mains switch.
  The green LED for "Supply ON" lights up.

- A tone sounds for approx. 0,25 sec.

0,25 sec

- The unit self-test starts up. All display segments and symbols light up for approx. 1 sec. Then the software version (VER x.x) is indicated for approx. 1 sec.

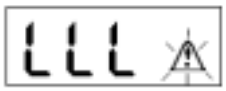


- Display shows the actual bath temperature. The pump starts up. The values which were active before switching off are used.

- If necessary add more bath liquid to replace the amount pumped out to the external circuit.
- If the pump does not purge the system immediately. The unit may switch off again although it is filled sufficiently (only when starting up for the first time).

** Notice only valid for EU countries*

– A double signal tone sounds



– The display for **LLL** (low-level) appears..
– The fault triangle is flashing.

– Press the key. If necessary repeat several times.
– Also press the key if the unit had switched off under a fault condition.

7.3 Set point selection

or

– Shortly press one of the keys → adjusted set point appears for approx. 4 sec.

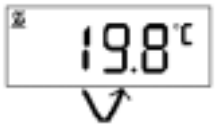
– °C is flashing, in contrast to the actual value.

or

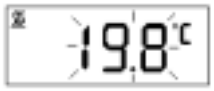
– During the 4 sec. start to set the required set point using the keys.
– Speeding the setting process by:

a) continuous pressing the keys **or**

b) Drücken einer der beiden Tasten, diese gedrückt halten, und gleich darauf kurzes Betätigen der anderen Taste



– Briefly releasing (1 sec) the key (s) and again pressing one of the keys moves the cursor **one place to the right**.



– Display flashes 4 sec → the new value is accepted automatically, **or**

– Value is entered immediately with this key.

– For safety reasons the set point can only be adjusted up to 2°C above the upper limit of the operating temperature range of the particular unit type.

7.4 Menu functions

– Switching from set point selection (level 0) to level 1 using the key.

or

– Within one level it is possible to scroll using the keys.

– **In principle**, after each setting has been made it is entered automatically after approx. 4 sec **or**
– Settings are entered immediately on operating this key.

7.4.1 Refrigeration system (level 1)

– The display shows C and the actual operating mode of the refrigeration system
0 = OFF, 1 = ON, A = automatic operation

– Press the key → display flashes for approx. 4 sec.

or

– During this time start to set the required operating mode with one of the keys. After 4 sec the value is entered automatically

– Forward with key to "pump output" **or**

– back with key to the actual value display.

– The refrigeration system can normally work with automatic operation = A.
The refrigeration system switches on or off depending on the temperature and operation status.

– In special cases the cooling machine can be switched off → ”0” or adjusted at permanent running → ”I”.

– The refrigerating machine cannot be added manually while running at maximum heating output, because then the maximum currents (⇨ 7.1) would be exceeded.

– The maximum heating output will be required for great set-point leaps.

7.4.2 Pump output

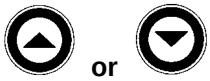
and **1x**

– Switch from the actual value display to pump output by pressing the key combination shown on the left **or**

– move forward from "Refrigeration system" with this key

– Display shows P and actual pump output step 1...5.

– Press the key → display flashes (approx. 4 sec).



or

– During this time start to set the required step with one of the keys.
1 = low pump output
2 , 3 , 4 = medium pump output
5 = maximum pump output

– The pump responds immediately (can be heard). (Setting is entered after approx. 4 sec ⇨ Section 7.4).

– Move forward with key to "User calibration" **or**

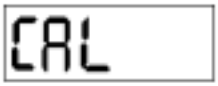
– Back with the key to "Refrigeration system".

7.4.3 User calibration

- Remove the external consumers and switch the flow setting knob of the pump to right side. (⇨Section 6.4)
- A reference thermometer with necessary accuracy is required. Otherwise the factory calibration should not be altered. The reference thermometer has to be inserted far enough and long enough into the bath.
- It is not allowed to calibrate to more than ± 3°C. Multiple calibration to more than ± 3°C cause internal faults (after 2min "**EEE**" changing with "**1006**" or "**16**").
- **The factory calibration will be lost through overwriting → please work carefully!!!**

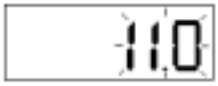
and **2x**

- Directly from actual value display to user calibration by pressing key combination on the left **or**
- with key from pump output.



> 2,5 sec

1. The display shows **CAL**. To carry out a calibration, press the key longer than 2.5 sec.



2. The actual value appears and flashes approx. 4 sec

or

3. During this time start the additive calibration. Input the value indicated on the reference thermometer with the two keys**.**

4. The additive calibration **must be** entered with the key shown on the left.

5. Forward with key to **END**, **then**

6. Switch back to level 0 **or**

7. with key back to pump output.

Example

a) Insert a suitable thermometer into the bath (long enough and far enough).

b) Remove the external consumers and turn the flow setting knob of the pump outflows to the right side.

c) Set the set point to a temperature where you use to work (e.g. set the set point to 45°C (⇨ Section 7.3)

d) Wait until the actual bath temperature has reached the set point temperature of 45°C and until the indication on the reference thermometer does not change any more.

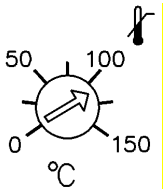
e) Remove the reference thermometer, which shows e.g. 44,8 °C.

f) Select **CAL** on the display and go forward as mentioned under point 1-7. The actual bath temperature switches from 45°C to 44,8°C and the unit starts to heat up until the actual bath temperature has reached 45°C. (→ the reference thermometer should also indicate 45°C).

7.5 Warning and safety functions

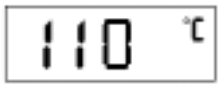
7.5.1 Overtemperature protection and testing

– The units are designed for operation with non-flammable and flammable liquids to EN 61010-2-010.



– Set the overtemperature switch-off point. Recommended setting 5°C above required bath temperature

– Not higher than 25°C below the fire point of the bath liquid (⇨ Section 6.3).



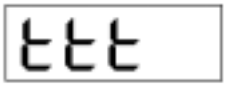
– The actual switch-off point is indicated on the display, e.g. **110°C**.

– The position of the potentiometer is decisive for the setting. The display is just a help for the setting.

– Setting is possible only up to a upper limit of the operating temperature range + 5°C.

– When the bath temperature arises above the overtemperature switch-off point:

1. Double signal tone sounds.
2. The display shows the indication for overtemperature **ttt** the fault triangle is flashing
   → heating is switched off on both poles,
   → pump and refrigeration system are switched off by the electronics..

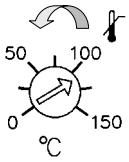


– Rectify the cause of the fault.

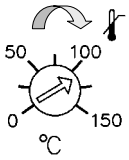
– Wait until the bath temperature has cooled down below the switch-off point or set the switch-off point at a value higher than the bath temperature. then the display shows **ttt**.

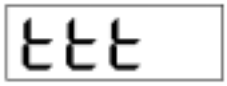
– Reset with the key

– Before the unit is running unattended for longer periods **overtemperature protection** should be tested. **Therefore**



– Turn the potentiometer slowly anticlockwise. → The unit must switch off at the bath temperature.





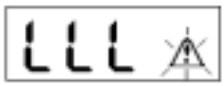
– Step 1 - 2 (see above) must follow.

– Set the overtemperature switch-off point again above the bath temperature and wait until the indication **ttt** appears on the display, **then**

– reset with the key.

7.5.2 Low-level protection and testing

– Double signal tone sounds, if the bath liquid falls so much that the heater is no longer covered with liquid completely.



1. The display shows **LLL** (low-level) and the fault triangle is flashing
   → heating is switched off on both poles,
   → pump and refrigeration system are switched off by the electronics.

2. Top up the bath (⇨ Section 6.2) and reset with the key.

– If necessary repeat several times in case that the pump does not purge immediately.

– **Testing at regular intervals** by lowering the bath level. Place a hose on the pump connector and pump some of the bath liquid into a suitable container.

– Step 1 - 2 must follow.

– Bath temperature during this test not below 0°C or higher than 50°C, otherwise danger of burn injuries!

– If there is any irregularity when testing the safety devices, switch off the unit immediately and pull out the mains plug!

– Have the unit checked by the **LAUDA service** or the local service organisation!

7.5.3 Pump motor monitoring

– In case of pump motor overload or a blockage the heating and the pump are switched off.

– Double signal tone sounds.

– The display shows **PPP** for pump and the fault triangle is flashing.

– Rectify the cause of the fault, e.g. clean the pump or check the viscosity, **then**

- reset with the key.
- If several faults appear simultaneously, they have to be reset individually.

7.5.4 Other error messages

- Other error messages shown on display. **EEE** changes with error code, e.g. **0**

- In case of error messages please contact the LAUDA Service Centre (or the service department of your LAUDA agent)! (⇨ 8.3)

- If the fault report is repeated → pull out the mains plug and try whether the motor can be rotated by the fan blade inserting a screwdriver into the ventilation opening at the back of the unit.
- Error code 0 ...255 → microprocessor error.
- Error code 1000...1255 → slave processor error.
- Indication can be used for remote diagnosis.

- After rectifying the fault, reset with the key.

8 Maintenance

8.1 Cleaning

- Before cleaning the unit, pull out the mains plug!

The unit can be cleaned with water adding a few drops of detergent (washing up liquid), using a moist cloth.

- Water must not enter the control unit!

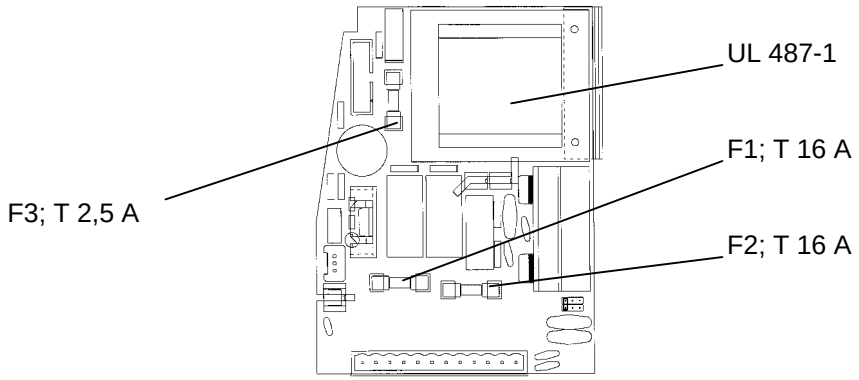
- Carry out appropriate detoxification if dangerous material has been spilled on or inside the unit.
- Method of cleaning and detoxification are decided by the special knowledge of the user. In case of doubt please contact the manufacturer.

8.2 Maintenance and repair

- Before any maintenance and repair work pull out the mains plug!
- Repairs on the control unit must only be carried out by properly qualified personnel!

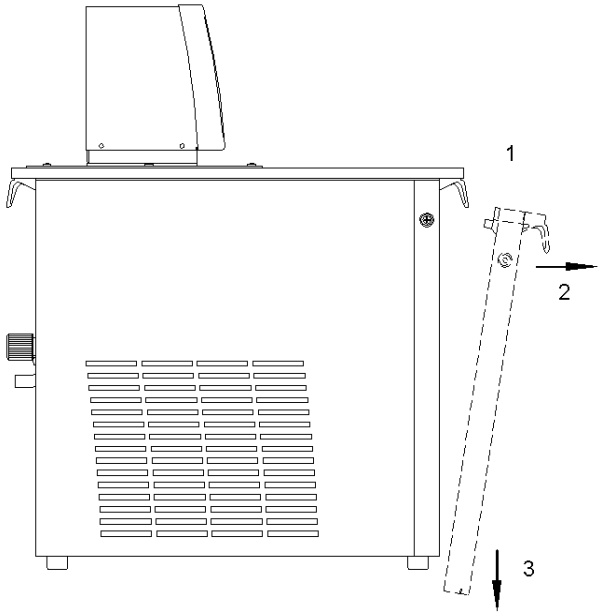
LAUDA thermostats are largely maintenance-free. If the thermostating liquid becomes dirty it has to be replaced (⇨ Section 6.2)

- If a fuse blows (→ supply indication not alight) fit only fuses as specified (2 x T 16 A; 1 x T 2,5 A, size 5 x 20 → fuses are inside the unit.



8.2.1 Maintenance of the refrigeration unit

The refrigeration unit operates largely without maintenance. Depending on the ambient dust conditions and the operating time, any dust on the heat exchanger (condenser) must be removed at intervals on 2 weeks or longer. This is done after taking off the front grille. Brush off the condenser and if necessary blow through with compressed air.



8.2.2 Note on repair and disposal

The refrigeration circuit is filled with a CFC-free refrigerant. Type and charging quantity are indicated on the unit. Repair and disposal by a qualified refrigeration engineer only!

If the equipment does have to be returned to the factory, it may only be necessary to dismantle the thermostat unit and return it.

☞ – If the equipment has to be returned to the factory, please ensure that it is carefully and properly packed. LAUDA accepts no responsibility for damage due to unsatisfactory packing.

8.3 Ordering spares

When ordering spares please quote instrument type and serial number from the rating label. This avoids queries and supply of incorrect items.

The serial number is combined like following, for example **LCK0861-06-0001**

LCK0861=	Article order number/ Ref. No.
06 =	manufacturing year 2006
0001 =	continuous numbering

Your contact for service and support

LAUDA Service Centre
Phone: +49 (0)9343/ 503-236 (English and German)
E-mail service@lauda.de

We are available any time for your queries, suggestions and criticism!

LAUDA DR. R. WOBSER GMBH & CO.KG
Post office box 1251
97912 Lauda-Koenigshofen
Germany
Phone: +49 (0)9343/ 503-0
Fax: +49 (0)9343/ 503-222
E-mail info@lauda.de
Internet http://www.lauda.de/

9 Technical data (according to DIN 12876)

			RE 104	RE 105
Operating temperature range		°C	- 10...150	-40...150
Ambient temperature range		°C	5...40 (⇨ Section 6.1)	
Setting resolution		°C	0,1	
Indication resolution		°C	0,1	
Indication accuracy			±0.4°C ③, additive re-calibration	
Temperature control		± °C	0.02	0.04
Safety features ①			III/ FL	
Heater power	230 V; 50/ 60 Hz 115 V; 60 Hz 100 V; 50/60 Hz	kW	1.5 1.3 1.0	
Cooling capacity (eff.) @ with ethanol at 20 °C ambient temperature	20°C 0°C -10°C -20°C -30°C -40°C	kW	0.18 0.12 0.05 --- --- ---	0.5 0.42 0.36 0.27 0.14 0.04
Pump type			pressure pump with choice of 5 output steps	
Max. discharge pressure ②		bar	0.4	
Max. flow rate ②		l/min	17	
Pump connections		mm	nipples Ø 13mm	
Max. bath volume		l	3...4.5	3...4.5 no usable capacity!
Bath opening (W x D)		mm	130x105	200x200
Bath depth		mm	160	40
Usable depth		mm	140	20
Height top edge of bath		mm	363	441
Overall size (W x D x H)		mm	180x320x524	280x400x602
Weight		kg	19	30
Power consumption	230 V; 50/ 60Hz 230 V; 50 Hz 115 V; 60 Hz 100 V; 50/60 Hz	kW	1.7 1.4 1.1	 1.7 1.4 1.3
Ref. No.	**230 V±10%; 50/60 Hz** **230 V±10%; 50 Hz** **115 V±10%; 60 Hz** **100 V±10%; 50/60 Hz**		**LCK 0861** **-----** **LCK 4861** **LCK 6861**	**-----** **LCK 1903** **-----** **-----**

* @ -10°C

① FL: suitable for flammable and non-flammable liquids

② at pump output step 5

③ → Section 1.2 last item

Units to EU Directive 89/336/EWG (EMC) and 73/ 23/ EWG (low-voltage) with CE-mark.

We reserve the right to make technical alterations!

			RE 106	RE 107	RE 110	RE 112	RE 120
Operating temperature range		°C	- 20...150	- 35...150	- 40...150	- 30...150	- 30...150
Ambient temperature range		°C	5...40 (⇨ section 6.1)				
Setting resolution		°C	0.1				
Indication resolution		°C	0.1				
Indication accuracy			±0.2°C ③, additive re-calibration				
Temperature control		± °C	0.02	0.04	0.04	0.04	0.04
Safety features ①			III/ FL				
Heater power	230 V; 50/ 60 Hz 230 V; 50 Hz 115 V; 60 Hz 100 V; 50/60 Hz	kW	1.5 --- 1.3 1.0	--- 1.5 1.3 1.0			
Cooling capacity (eff.) @ with ethanol at 20 °C ambient temperature	20°C 0°C -10°C -20°C -30°C -40°C	kW	0.20 0.15 0.1 0.05 ---- ----	0.30 0.22 0.15 0.10 0.06 ----	0.50 0.42 0.36 0.27 0.14 0.04	0.30 0.23 0.19 0.13 0.04 ----	0.35 0.25 0.18 0.10 0.04 ----
Pump type			Druckpumpe mit 5 wählbaren Leistungsstufen				
Max. discharge pressure ②		bar	0.4				
Max. flow rate ②		l/min	17				
Pump connections		mm	nipples Ø 13mm				
Max. bath volume		l	4...6	4...6	7...9.5	9...12	14...20
Bath opening (W x D)		mm	150x130	150x130	200x200	200x200	300x350
Bath depth		mm	160	160	160	200	160
Usable depth		mm	140	140	140	180	140
Height top edge of bath		mm	396	396	441	441	441
Overall size (W x D x H)		mm	200x400x557	200x400x557	280x400x602	250x400x602	350x530x602
Weight		kg	23.5	24.5	30	28	40
Power consumption	230 V; 50/ 60Hz 230 V; 50 Hz 115 V; 60 Hz 100 V; 50/60 Hz	kW	1.8 --- 1.4 1.1	 1.9 1.4 1.1	 2.1 1.4 1.3	 1.9 1.4 1.1	 2.0 1.4 1.2
Ref. No.	**230 V±10%; 50/60 Hz** **230 V±10%; 50 Hz** **230 V±10%; 60 Hz** **115 V±10%; 60 Hz** **100 V±10%; 50/60 Hz** **208 V±10%; 60 Hz**		**LCK 0864** **-----** **-----** **LCK 4864** **LCK 6864** **-----**	**-----** **LCK 1867** **LCK 2867** **LCK 4867** **LCK 6867** **-----**	**-----** **LCK 1882** **-----** **LCK 4882** **-----** **LCK 8882**	**-----** **LCK 1870** **LCK 2870** **LCK 4870** **LCK 6870** **-----**	**-----** **LCK 1873** **LCK 2873** **LCK 4873** **LCK 6873** **-----**

* @ -10°C

① FL: suitable for flammable and non-flammable liquids

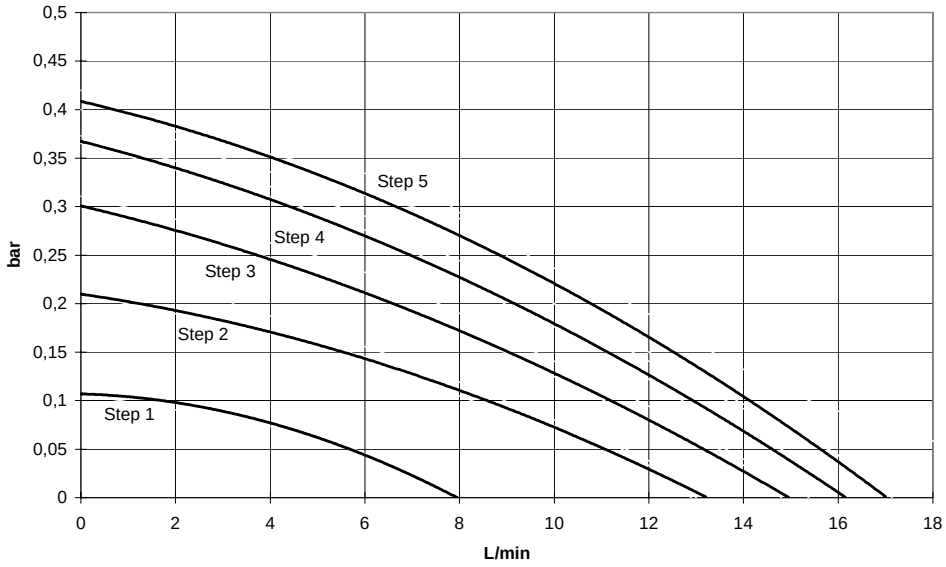
② at pump output step 5

③ → Section 1.2 last item

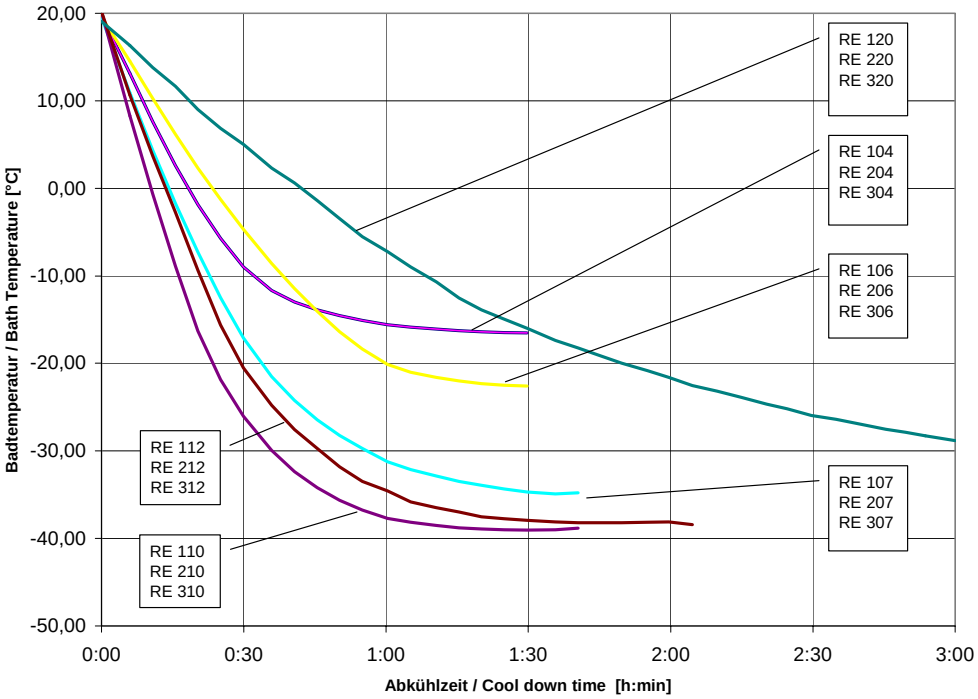
Units to EU Directive 89/336/EWG (EMC) and 73/ 23/ EWG (low-voltage) with CE-mark.

We reserve the right to make technical alterations!

Pump characteristics
measured with water



Cooling curve
measured with ethanol



Bath liquid:
water/glycol 1:1
(to -25°C) as bath liquid

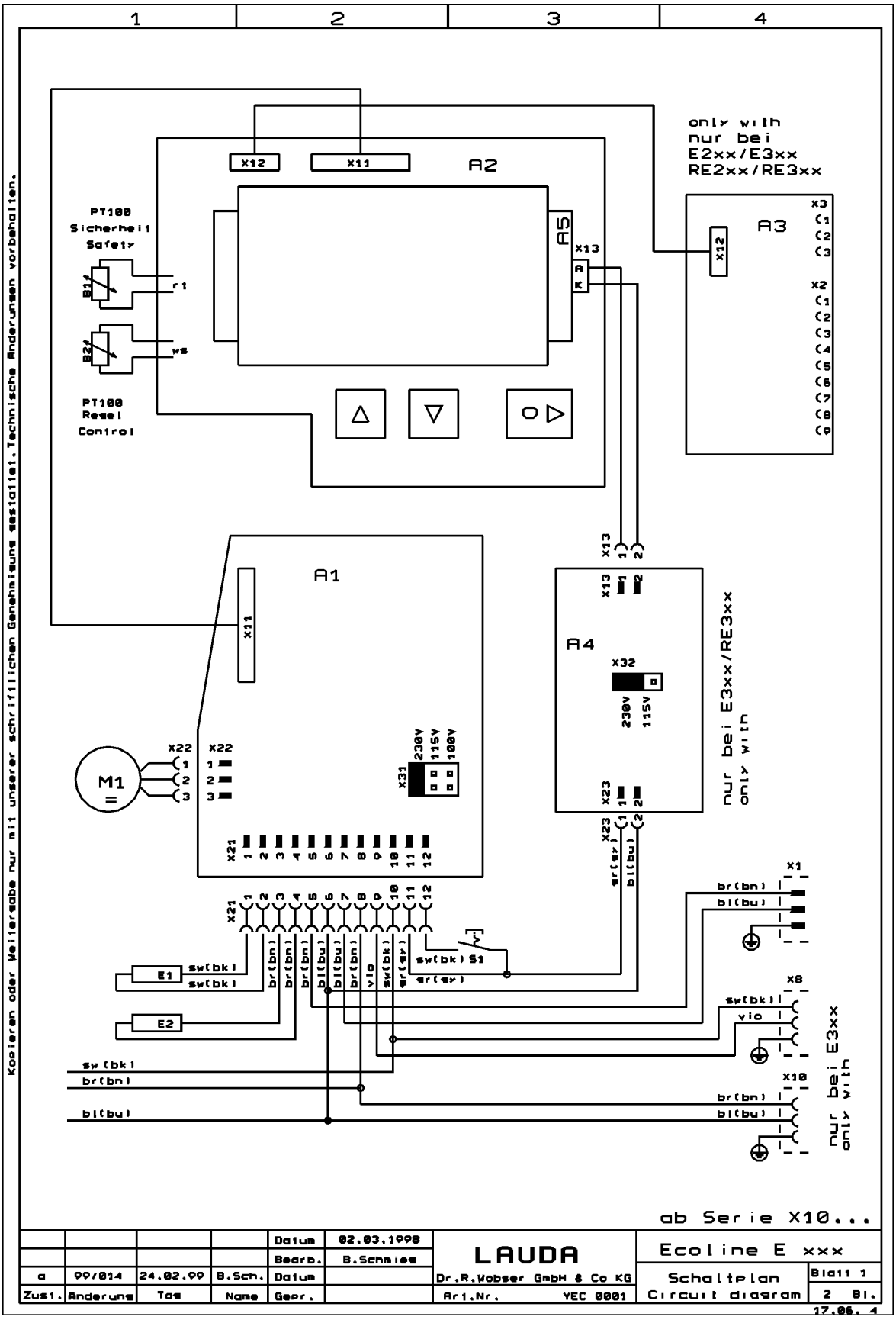
Time from graph
x 1.7

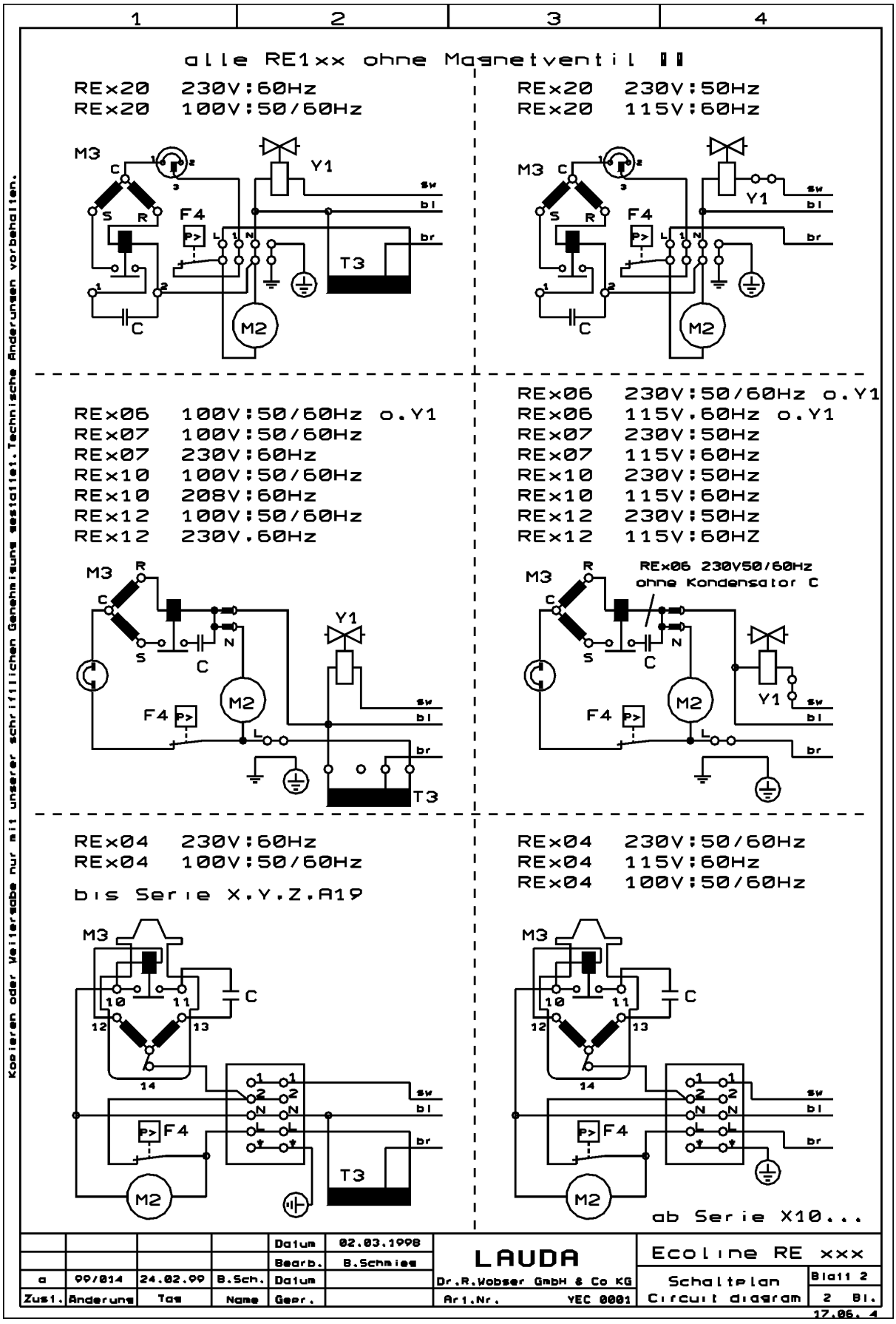
10 Accessories

Accessories	suitable for	Ref. No.
Bath cover two parts	RE 120	LCZ 0633
Gable cover	RE 120	LCZ 011
Rising platform 8 steps	RE 106, RE 107	LCZ 0646
Rising platform 8 steps	RE 110, RE 112	LCZ 0647
Rising platform 8 steps	RE 120	LCZ 0635
Tubing clamp stainless steel 10-16mm		EZS 012

For further accessories please contact us.

11 Circuit diagram




1
2
3
4
alle RE1xx ohne Magnetventil !!
REx20 230V:60Hz
REx20 100V:50/60Hz
REx20 230V:50Hz
REx20 115V:60Hz
REx06 100V:50/60Hz o.Y1
REx07 100V:50/60Hz
REx07 230V:60Hz
REx10 100V:50/60Hz
REx10 208V:60Hz
REx12 100V:50/60Hz
REx12 230V.60Hz
REx06 230V:50/60Hz o.Y1
REx06 115V.60Hz o.Y1
REx07 230V:50Hz
REx07 115V:60Hz
REx10 230V:50Hz
REx10 115V:60Hz
REx12 230V:50Hz
REx12 115V:60HZ
REx06 230V50/60Hz
ohne Kondensator C
REx04 230V:60Hz
REx04 100V:50/60Hz
bis Serie X.Y.Z.A19
REx04 230V:50/60Hz
REx04 115V:60Hz
REx04 100V:50/60Hz
ab Serie X10...
M3
M2
Y1
T3
F4
C
sw
bl
br
Kopieren oder Weitergabe nur mit unserer schriftlichen Genehmigung gestattet. Technische Änderungen vorbehalten.
Datum 02.03.1998
Bearb. B.Schmies
a 99/014 24.02.99 B.Sch. Datum
Zus1. Änderung Tag Name Gepr.
LAUDA
Dr.R.Wobser GmbH & Co KG
Art.Nr. YEC 0001
Ecoline RE xxx
Schaltplan
Circuit diagram
Blatt 2
2 Bl.
17.06.4

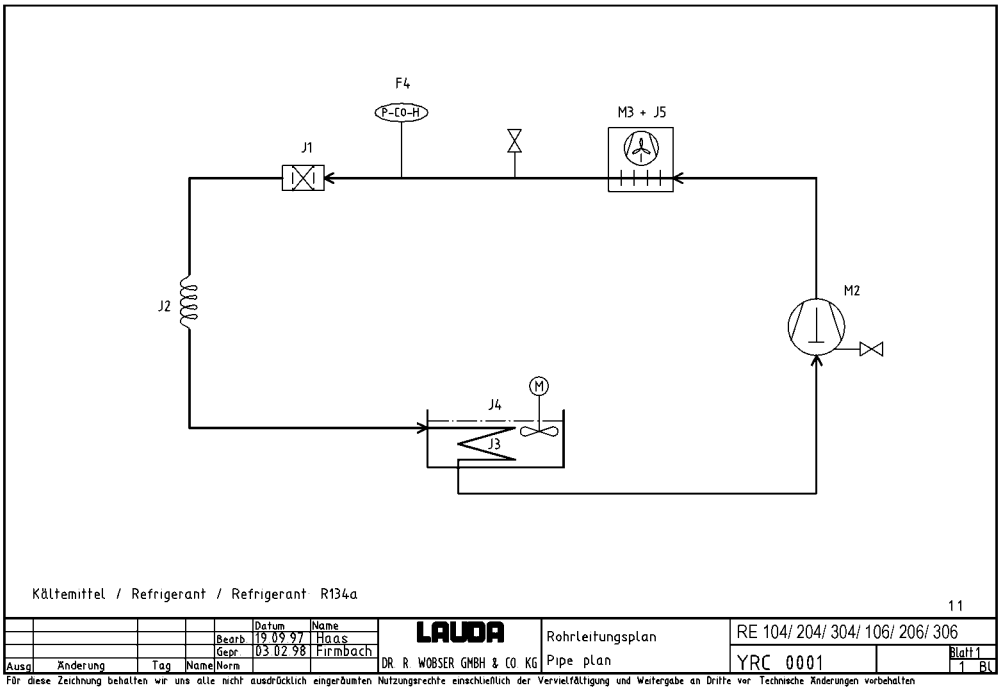
230V; 50Hz ◆ 230V 50/60Hz ◆ [230V; 60Hz] from serial number: 04-0001

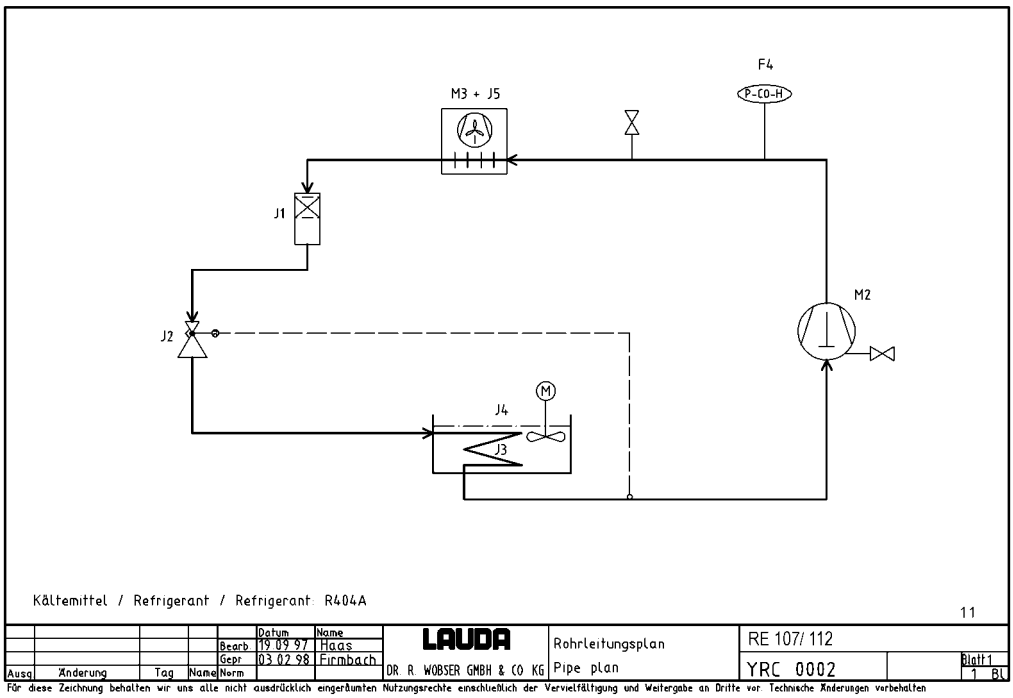
				RE 1xx
	A 1	Printed circuit board „Mains“		UL 487-1
	A 2	Printed circuit board „Display“		UL 488-1A
	A 3	Printed circuit board serial interface RS 232/RS 485		----------
	A 4	Printed circuit board Mains LED-Backlight		---------
	A 5	Printed circuit board Display LED-Backlight		---------
	B 1	Pt100 probe safety circuit		ETP 057
	B 2	Pt100 probe actual value		
	E 1	Heater 1,5 kW		EH 168
	E 2	Heater 2,25 kW		----------
	M 1	Pump motor		EM 109
	S 1	Mains switch		EST 101
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	X 1	Mains connection		EKN 001
	X 2	Lock screw		---------
	X 8	Connection socket Cooling (Stakei 2)		---------
	X 10	Connection socket Cooling unit (Stakei 200)		---------
	X 13	Housing 2pol.		---------
	X 21	Plug strip terminal 12pol.		EQF 079
	X 23	Line up terminal 2pol.		---------
RE 004	F 4	Pressure switch		ES 045
	M 2	Compressor		EMV 050
	M 3	Fan		EML 052
RE 005	F 4	Pressure switch		ES 048
	M 2	Compressor		EMV 056
	M 3	Fan		EML 057
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
RE 006	F 4	Pressure switch		ES 045
	M 2	Compressor		EMK 186
	M 3	Fan		---------
RE 007	F 4	Pressure switch		ES 045
	M 2	Compressor		EMV 011
	M 3	Fan		EML 042
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	[T 3	Transformer		EIT 125
RE 010	F 4	Pressure switch		ES 048
	M 2	Compressor		EMV 056
	M 3	Fan		EML 057
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
RE 012	F 4	Pressure switch		ES 045
	M 2	Compressor		EMV 011
	M 3	Fan		EML 042
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	[T 3	Transformer		EIT 125
RE 020	F 4	Pressure switch		ES 045
	M 2	Compressor		EMK 146
	M 3	Fan		
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	[T 3	Transformer		EIT 125

115V; 60Hz ◆ [100V; 50/60Hz] ◆ *208V; 60Hz* from serial number: 04-0001

				RE 1xx
	A 1	Printed circuit board „Mains“		UL 499
	A 2	Printed circuit board „Display“		UL 488-1A
	A 3	Printed circuit board serial interface RS 232/RS 485		----------
	A 4	Printed circuit board Mains LED-Backlight		---------
	A 5	Printed circuit board Display LED-Backlight		---------
	B 1	Pt100 probe safety circuit		ETP 057
	B 2	Pt100 probe actual value		
	E 1	Heater	1,3 kW at 115V 1,0 kW at 100V	EH 171
	M 1	Pump motor		EM 109
	S 1	Mains switch		EST 101
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	X 1	Mains connection		EKN 003
	X 2	Lock screw		---------
	X 8	Connection socket Cooling (Stakei 2)		---------
	X 10	Connection socket Cooling unit (Stakei 200)		---------
	X 13	Housing 2pol.		---------
	X 21	Plug strip terminal 12pol.		EQF 079
	X 23	Line up terminal 2pol.		---------
RE 004	F 4	Pressure switch		ES 045
	M 2	Compressor		EMV 049
	M 3	Ventilator		EML 051
RE 005	F 4	Pressure switch		ES 048
	M 2	Compressor		EMV 055
	M 3	Fan		EML 056
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
RE 006	F 4	Pressure switch		ES 045
	M 2	Compressor		EMK 187
	M 3	Fan		----------
	[T 3	Transformer		EIT 122
RE 007	F 4	Pressure switch		ES 045
	M 2	Compressor		EMV 012
	M 3	Fan		EML 033
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	[T 3	Transformer		EIT 122
RE 010	F 4	Pressure switch		ES 048
	M 2	Compressor		EMV 055
	M 2	*Compressor*		EMV 057
	M 3	Fan		EML 056
	M 3	*Fan*		*EML 057*
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	Y 1	*Solenoid valve*		---------
RE 012	F 4	Pressure switch		ES 045
	M 2	Compressor		EMV 012
	M 3	Fan		EML 033
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	[T 3	Transformer		EIT 122
RE 020	F 4	Pressure switch		ES 045
	M 2	Compressor		EMK 181
	M 3	Fan		---------
	U 3	SSR (BRT22H)	Y 1 output A1	---------
	Y 1	Solenoid valve		---------
	[T 3	Transformer		EIT 122

12 Pipe plan


F4
P-CO-H
M3 + J5
J1
J2
M2
M
J4
J3
Kältemittel / Refrigerant / Refrigerant R134a
11
Datum Name
Bearb 19.09.97 Haas
Gepr 03.02.98 Firmbach
Ausg Änderung Tag Name Norm
LAUDA
DR. R. WOBSER GMBH & CO. KG
Rohrleitungsplan
Pipe plan
RE 104/ 204/ 304/ 106/ 206/ 306
YRC 0001
Blatt 1
1 BL
Für diese Zeichnung behalten wir uns alle nicht ausdrücklich eingeräumten Nutzungsrechte einschließlich der Vervielfältigung und Weitergabe an Dritte vor. Technische Änderungen vorbehalten


F4
P-CO-H
M3 + J5
J1
J2
M2
M
J4
J3
Kältemittel / Refrigerant / Refrigerant R404A
11
Datum Name
Bearb 19.09.97 Haas
Gepr 03.02.98 Firmbach
Ausg Änderung Tag Name Norm
LAUDA
DR. R. WOBSER GMBH & CO. KG
Rohrleitungsplan
Pipe plan
RE 107/ 112
YRC 0002
Blatt 1
1 BL
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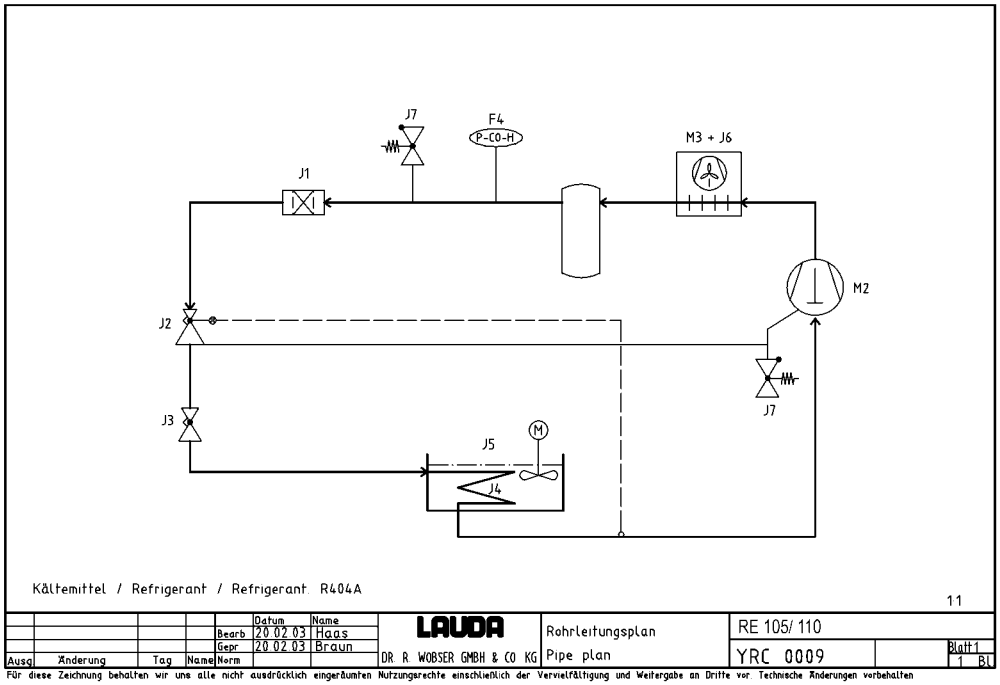
J7
F4
P-CO-H
M3 + J6
J1
M2
J2
J7
J3
M
J5
J4
Kältemittel / Refrigerant / Refrigerant R404A
1:1
Datum Name
Bearb 20 02 03 Haas
Gepr 20 02 03 Braun
Norm
Ausg Änderung Tag Name
LAUDA
DR R WOBSER GMBH & CO KG
Rohrleitungsplan
Pipe plan
RE 105/ 110
YRC 0009
Blatt 1
1 Bl
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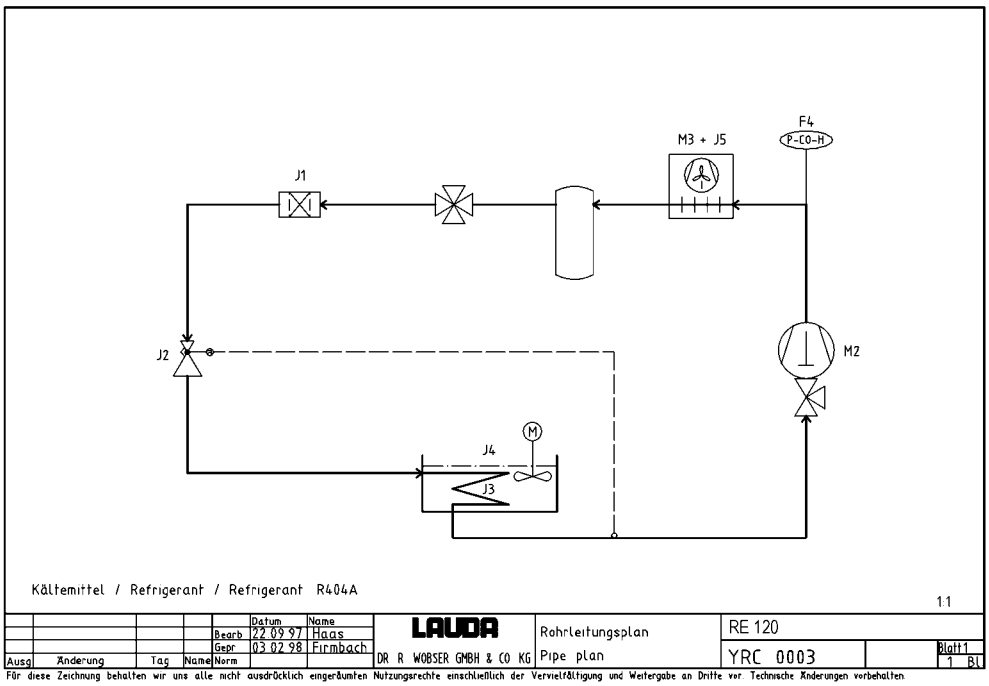
M3 + J5
F4
P-CO-H
J1
M2
J2
M
J4
J3
Kältemittel / Refrigerant / Refrigerant R404A
1:1
Datum Name
Bearb 22 09 97 Haas
Gepr 03 02 98 Firmbach
Norm
Ausg Änderung Tag Name
LAUDA
DR R WOBSER GMBH & CO KG
Rohrleitungsplan
Pipe plan
RE 120
YRC 0003
Blatt 1
1 Bl
Für diese Zeichnung behalten wir uns alle nicht ausdrücklich eingeräumten Nutzungsrechte einschließlich der Vervielfältigung und Weitergabe an Dritte vor. Technische Änderungen vorbehalten

230V; 50Hz ◆ 230V; 50/60Hz ◆ [230V; 60Hz] from serial number: 04-0001

RE 104	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2	Compressor		EMV 050
	M 3	Fan		EML 052
	J 1	Drier	EO 003	EO 003
	J 2	Capillary	HKA 114	HKA 114
	J 3	Evaporator		----------
	J 4	Bath		----------
	J 5	Condenser		----------
RE 105	F 4	Pressure switch	CC25 28/18 bar	ES 048
	M 2	Compressor	NE2134GK	EMV 056
	M 3	Fan	Type: RM11;GT11;RMV10;VN10-20	EML 057
	J 1	Filter drier / receiver	CNO732s	EO 044
	J 2	Injection valve	TLEX-00216	EVE 128
	J 3	Injection valve	AEL 0,5 1-7bar Type: AEL:222200	EVE 135
	J 4	Evaporator		----------
	J 5	Bath		----------
	J 6	Condenser		EOW 089
RE 106	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2 + M 3 + J 5	Cooling unit	AZ 411	EMK 186
	J 1	Drier		EO 003
	J 2	Capillary		HKA 114
	J 3	Evaporator		----------
	J 4	Bath		----------
RE 107	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2	Compressor	AZ 411	EMV 011
	M 3	Fan	W2S-130-AA75-(A2)	EML 042
	J 1	Filter drier / receiver	CNO 432 s	EO 040
	J 2	Injection valve	TKL 0,3 R404A MOP 2,5 Nr.0483	EVE 111
	J 3	Evaporator		----------
	J 4	Bath		----------
	J 5	Condenser		EOW 085
	Y 1	Solenoid valve	2/2Wege 6mm Löt Type: 1028/2	----------
	[T 3	Transformer		EIT 125]
RE 110	F 4	Pressure switch	CC25 28/18 bar	ES 048
	M 2	Compressor	NE2134GK	EMV 056
	M 3	Fan	Type: RM11;GT11;RMV10;VN10-20	EML 057
	J 1	Filter drier / receiver	CNO732s	EO 044
	J 2	Injection valve	TLEX-00216	EVE 128
	J 3	Injection valve	AEL 0,5 1-7bar Type: AEL:222200	EVE 135
	J 4	Evaporator		----------
	J 5	Bath		----------
	J 6	Condenser		EOW 089
RE 112	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2	Compressor	AZ 411	EMV 011
	M 3	Fan	W2S-130-AA75-(A2)	EML 042
	J 1	Filter drier / receiver		EO 040
	J 2	Injection valve		EVE 111
	J 3	Evaporator		----------
	J 4	Bath		----------
	Y 1	Solenoid valve	2/2Wege 6mm Löt / Type: 1028/2	----------
	[T 3	Transformer	EIT 125	EIT 125]
RE 120	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2+M 3+J 5	Cooling unit	UB 6144 Z	EMK 146
	J 1	Drier	DN 032 s	EO 041
	J 2	Injection valve	TKL -0,5 R404A MOP 3,3 Nr.0484	EVE 112
	J 3	Evaporator		----------
	J 4	Bath		----------
	Y 1	Solenoid valve	2/2Wege 6mm Löt / Type: 1028/2	----------
	[T 3	Transformer		EIT 125]

115V; 60Hz ◆ [100V; 50/60Hz] ◆ *208V; 60Hz* from serial number: 04-0001

RE 104	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2	Kompressor		EMV 049
	M 3	Fan		EML 051
	J 1	Drier	EO 003	EO 003
	J 2	Capillary	HKA 114	HKA 114
	J 3	Evaporator		----------
	J 4	Bath		----------
	J 5	Condenser		----------
RE 105	F 4	Pressure switch	CC25 28/18bar	ES 048
	M 2	Compressor	NE2134GK Code: 952AG51B9AY	EMV 055
	M 3	Fan	Type:NET3T09PUN302/ 9W	EML 056
	J 1	Filter drier / receiver	CNO732s	EO 044
	J 2	Injection valve	TLEX-00216	EVE 128
	J 3	Injection valve	AEL 0,5 1-7bar Type: AEL 222200	EVE 135
	J 4	Evaporator		----------
	J 5	Bath		----------
	J 6	Condenser	D 38668	EOW 089
RE 106	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2 + M 3 + J 5	Cooling unit	AZ 4419 Y/A	EMK 187
	J 1	Drier		EO 003
	J 2	Capillary		HKA 114
	J 3	Evaporator		----------
	J 4	Bath		----------
	[T 3	Transformer		EIT 122]
RE 107	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2	Compressor	AZ 4419 Y-A	EMV 012
	M 3	Fan	W2E-142-CC13-16	EML 033
	J 1	Filter drier / receiver	CNO 432 s	EO 040
	J 2	Injection valve	TKL 0,5 R404A MOP 2,5 Nr.0483	EVE 111
	J 3	Evaporator		----------
	J 4	Bath		----------
	J 5	Condenser		EOW 085
	Y 1	Solenoid valve	2/2Wege 6mm Löt / Type: 1028/2	----------
	[T 3	Transformer		EIT 122]
RE 110	F 4	Pressure switch	CC25 28/18bar	ES 048
	M 2	Compressor	NE2134GK Code: 952AG51B9AY	EMV 055
	M 2	*Compressor*	*NE2134GK Code: 953AD*	*EMV 057*
	M 3	Fan	Type:NET3T09PUN302/ 9W	EML 056
	M 3	*Fan*	*Type:NET4T10ZVN001/ 10W*	*EML 057*
	J 1	Filter drier / receiver	CNO732s	EO 044
	J 2	Injection valve	TLEX-00216	EVE 128
	J 3	Injection valve	AEL 0,5 1-7bar Type: AEL 222200	EVE 135
	J 4	Evaporator		----------
	J 5	Bath		----------
	J 6	Condenser	D 38668	EOW 089
RE 112	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2	Compressor	AZ 4419 Y-A	EMV 012
	M 3	Fan	W2E-142-CC13-16	EML 033
	J 1	Filter drier / receiver	CNO 432 s	EO 040
	J 2	Injection valve	TKL 0,5 R404A MOP 2,5 Nr.0483	EVE 111
	J 3	Evaporator		----------
	J 4	Bath		----------
	Y 1	Solenoid valve	2/2Wege 6mm Löt / Type: 1028/2	----------
	[T 3	Transformer		EIT 122]
RE 120	F 4	Pressure switch	CC80 24/18 bar	ES 045
	M 2+M 3+J 5	Cooling unit	UB 6144 Z/2	EMK 181
	J 1	Filter drier	DN 032 s	EO 041
	J 2	Injection valve	TKL 0,5 R404A MOP 3,3 Nr.0484	EVE 112
	J 3	Evaporator	----------	----------
	J 4	Bath	----------	----------
	Y 1	Solenoid valve	2/2Wege 6mm Löt / Type: 1028/2	----------
	[T 3	Transformer		EIT 122]

BESTÄTIGUNG / CONFIRMATION / CONFIRMATION

An / To / A:
LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

Von / From / De :

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):
We herewith confirm that the following LAUDA-equipment (see label):
Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

Typ / Type / Type :	**Serien-Nr. / Serial no. / No. de série:**

mit folgendem Medium betrieben wurde
was used with the below mentioned media
a été utilisé avec le liquide suivant

_____

_____

_____

_____

Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.

Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.

D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangeureux dans la cuve.

Stempel **Seal / Cachet.**	**Datum** **Date / Date**	**Betreiber** **Responsible person / Personne responsable**

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Fax: +49 (0)9343 / 503-222
E-mail: info@lauda.de